

## Tevatron collider progress: Sept to November 2002

I. Luminosity: → early Sept (5 stores #1735-1750)

Average initial peak  $L=22.1$

→ late Oct (5 stores #1906-1918)

Average initial peak  $L=28.3$

or 28% increase =

+mostly due to larger  $N_{\text{pbar}}$  at low-beta

( $N_{\text{p}}$  -3%,  $N_{\text{pbar}}=+24\%$ ,  $\epsilon_{\text{eff}}^{-1} +8\%$ )

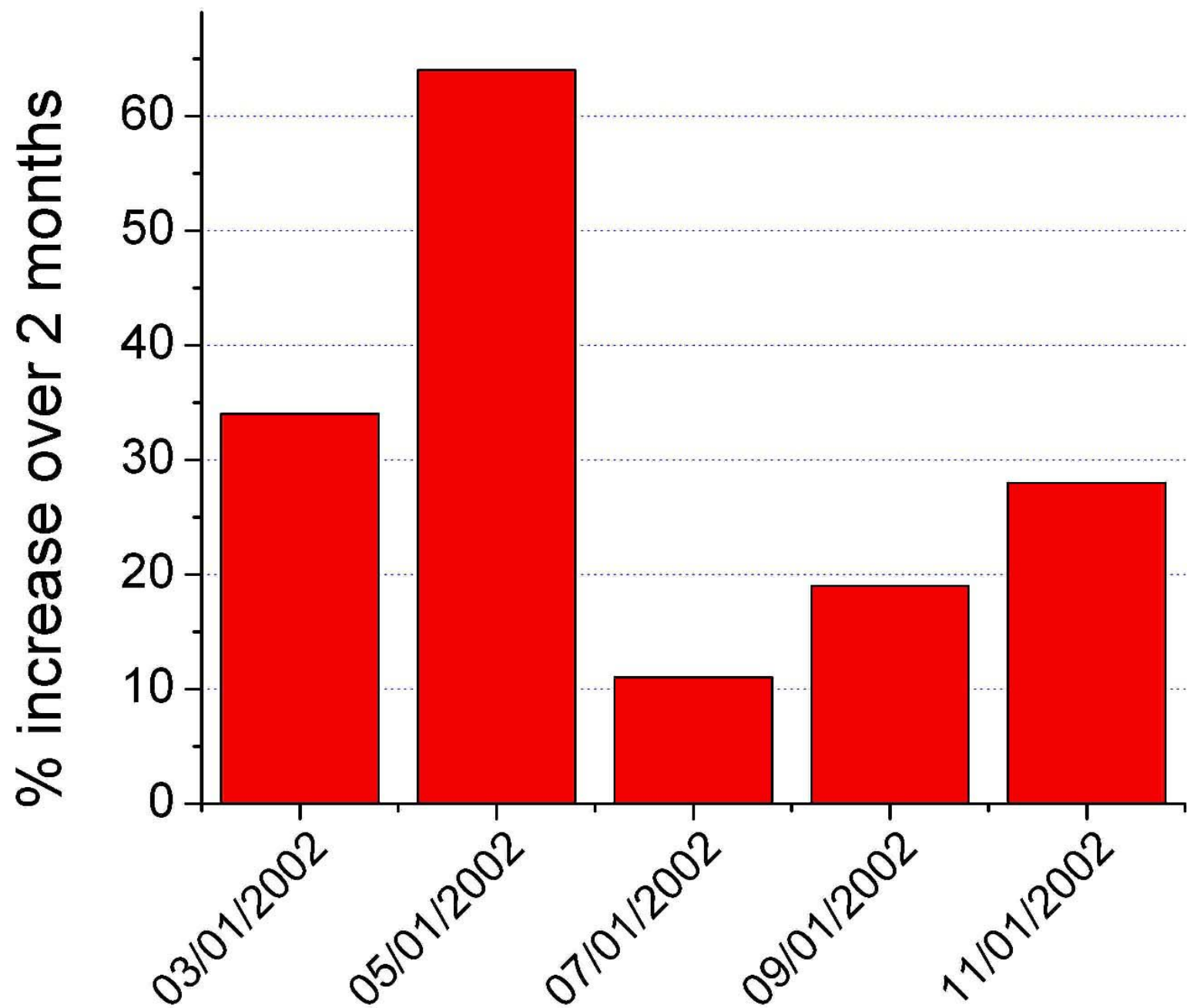
Record  $L$  as of Sep.1  $26.4e30$  store #1583

Record  $L$  as of Nov.1  $36.1e30$  store #1836 (or +37%)

Reasons: - *Tev pbar-injection error fixed (+20%)*

- *MI pbar coalescing fixed (+15%)*

Lifetimes of  $L$ ,  $N_{\text{p}}$ ,  $N_{\text{pbar}}$  are about the same as in Sept



## II. Reliability: → improved, in general

- 35 pb<sup>-1</sup> over last 8 weeks
- 6.7 pb<sup>-1</sup> in a record week
- strange effects of pbars on p's (5 quenches)
- maintenance eats (reduced) study time

## III. Technical progress:

- transverse dampers operational (Tan, JS)
- BLT works (DM, VSc, JA)
- dE/phase error detector (DM)
- pbar intensity re-calibrated (RFI, Alvin)
- tune/coupling drifts stabilized (MM, JA)
- head-tail monitor, C<sub>v,h</sub> out (VSc, PI, AB)
- MI/Tev  $\sigma_s$  difference resolved (RM, IK)
- SBD reports  $\sigma_s$  for antiprotons (Instr)
- orbit oscillation monitor works (XLZ)

## Technical issues for next 2 months :

- Prepare for Jan'03 shutdown  
(CO, Schottky, Vacuum, Alignment, TEL)
- fix "jumping FW" emittances (Instr)
- Slite pbar size/tilt "puzzle" (Harry)
- Determine Tev BPM requirements (JS+)
- SBD - need no gaps in 1 Hz data (Flora)
- FBI - pbar channel recalibrate ( Alvin+)

## IV. Progress in Physics/Understanding:

- $Z_T = 3-5 \text{ M}\Omega/\text{m}$  from head-tail (PI, AB)
- Break-down of loss mechanisms (Alvin)
- Progress in AO & CO projects (AX, MM, JJ)
- b2 measurements at MTF (PB, MM, JA)
- ramp efficiency results (FS, TS)
- new RF noise results (TD guys, VL)
- new simulations of collimators (SD, NM, VL)
- lifetime vs larger helix/BO decpl (TS, BE, MX)
- SDA:  $d\varepsilon/dt$  vs  $N$ ,  $\sqrt{\text{time}}$  (PL, TS, VS)

Less progress, Issues, Studies needed:

- injection mismatch (VL, AX, +MI guys)
- scallops should be stopped (DS, VS, +)
- P,Pbar loss on ramp 12% as before (FZ, TS, VS)
- Beam-beam on protons (collect data)
- Shave  $C_{v,h}$  on ramp, 980 with dampers (Tan+)
- Beam-beam at 150 vs helix,  $N_p$  (TS, BE, MX )
- See pbar tunes: Schottky/TEL (MH, XLZ, +)
- transverse instability/octupoles (PI, AB, )
- TEL as BBC in stores (TEL guys)

## V. General comments+shutdown:

- a) we successfully survived two reviews in October
- b) Vahid Ranjbar joined the Tev Dept as RA
- c) several new people from other departments/divisions are now working on the Tevatron projects, including P.Bauer, A.Burov, R.Stefanski, J.Volk, D.Finley
- d) goal for FY'03 : 200 pb-1 (base), 320 pb-1 (stretched)

## Reduced time for studies:

- a) we prepare studies somewhat better and are better organized (Dean+Jerry)
- b) studies + maintenance took about 14 shifts per month since Sept → we did/do/will ask for 6-7 shifts of studies every other week

## Major projects for Jan'03 shutdown:

- CO Lambertson replacement (P.Garbincius, +)
- New Schottky detectors (RP, JS +)
- Vacuum improvement (BH) - ?
- TEL modification (VS) - ?
- Alignement (RS, MS, etc) - ?

## V. Expectations

(last time it was "Peak luminosity of  $3.2-4.0 \times 10^{31}$  early November" we have  $3.67 \dots$ ):

pbar emittance improved ( $< 20 \pi$  H at 150/LB?) in 2 mos

(A1 line, Tevatron optics, BLT, etc)

→ some 5-10% in  $N_{\text{pbar}} = 5-10\%$  luminosity increase

more protons to LB ( $> 6600 \times 10^9$ ) in 2 month

(dampers, octupoles, "shaving in MI?")

→ some 5% luminosity increase

larger stack size ( $> 180$  mA) in 2 month

→ some 4-8% luminosity increase

...as the result →

→ some 10-20% improvement in luminosity

Peak luminosity of  $3.7-4.4 \times 10^{31}$  early January